

Name _____

period _____

The Shrinking Lab: An examination of quantities of atoms in a reaction

Fortunately and unfortunately, since you have just been exposed to the atmosphere of this room, you have shrunk to a height of approximately 400 Angstroms- fortunately, because you are now small enough to perceive the world of atoms and molecules directly; unfortunately, because you are now perilously small and exposure to the outside world (Even a bacterium is now 1,000,000 times larger than you!) could lead to catastrophe. In order to leave this time-space warp, you must present this results' sheet to the doorkeeper. You will be given a bag of atoms to work with. Please follow directions carefully or you risk being trapped here forever. **This is an Individual Project although you may seek help from anyone in the class during the lab event.**

Given the reaction: $\text{G}_3\text{M}_8 + \text{S}_2 \Rightarrow \text{GS}_2 + \text{M}_2\text{S}$

1. In one G_3M_8 molecule, there are _____ G atoms and _____ M atoms.

2. Balance the equation:

3. Using all of the atoms of a given type in your kit, determine the average atomic mass of each atom. You do not have to mass each atom individually. [Our balances have also shrunk today, so they now weigh in **atomic mass units (AMUs)** instead of grams.] All masses must have units.

G:	M:	S:
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4. Calculate the mass of 1 dozen (12) of each type of atom.

G:	M:	S:
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5. Calculate the mass of 1 mole of each type of atom. 1 mole = 6.022×10^{23} . Pay particular attention to significant figures here.

G:	M:	S:
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6. Convert your answers in problem number 5 to grams. 1 gram = 6.022×10^{23} AMU.
Don't forget your units (grams)

G:	M:	S:
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7. Compare the mass of 1 atom (question 3) with the mass of a mole of atoms (question 6). Write an explanation.

8. Calculate what the molecular masses of each of the reactants and products should be (from problem 3) [Using AMUs]

G₃M₈	S₂	GS₂	M₂S
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9. Determine the actual molecular masses of the reactants and products by massing them.

G₃M₈	S₂	GS₂	M₂S
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10. Show, on the back of this paper, using the molecular masses (8), and the coefficients of the balanced equation (2), that mass is conserved in the reaction.

11. Estimate the mass of each of the following. (Be sure to include **units**)

3 G₃M₈ molecules	4 <u>dozen</u> GS₂ molecules	2.5 <u>moles</u> of M₂S molecules

12. What percent of the mass of a G_3M_8 molecule comes from G atoms?

13. How many grams of G are in 250 g of G_3M_8 ?

14. How many grams of S_2 will react with 17.3 g of G_3M_8 ?

15. How many grams of GS_2 and M_2S should be formed from the reaction in 14?

16. How many GS_2 molecules can be made from 5. g of G_3M_8 and 5. g of S_2 ?